

## **ABSTRACT OF THE INVENTION**

A method is disclosed for designing two separable filters, **LPP** & **HPP**, that, when applied in sequence with a subtraction step, approximates the circularly symmetric frequency response achievable using a non-separable filter. The method of the present invention comprising: First, (a) selecting a cut-off  
5 frequency and designing therefrom a 1-D low pass filter **LP** such that:  $\mathbf{LP} = [X_{-n}, X_{-(n-1)}, \dots X_0, \dots X_{n-1}, X_n]$ . Next, (b) obtaining a 2-D filter **LPP** by performing the operation:  $\mathbf{LP}^* \times \mathbf{LP}$ ; wherein  $\mathbf{LP}^*$  is a column vector having the same entries as **LP** and **LPP** having dimensions given by:  $\{2n+1, 2n+1\}$ ; and generating a 2-D contour plot therefor. Next, (c) designing a 1-D high pass filter **HP** such that:  
10  $\mathbf{HP} = [Y_{-m}, Y_{-(m-1)}, \dots Y_0, \dots Y_{m-1}, Y_m]$ . Next, (d) obtaining a 2-D filter **HPP** by performing the operation:  $\mathbf{HP}^* \times \mathbf{HP}$ ; wherein  $\mathbf{HP}^*$  is a column vector having the same entries as **HP** and **HPP** having dimensions:  $\{2m+1, 2m+1\}$  and obtaining a 2-D contour plot therefor. Next, (e) repeating (c) through (d) until the 2-D contour plot of **HPP** overlaps the 2-D contour plot of **LPP**. Next, (f) generating a 2-D  
15 filter **ONE** having the dimensions of that of **HPP** with the only non-zero entry of value 1 located at the center of **ONE**. Next, (g) creating matrix **HPPinv** by subtracting **HPP** from **ONE**. Next, (h) convolving **LPP** with **HPPinv** to obtain **DSCRN** having dimensions:  $\{2m+2n+1, 2m+2n+1\}$ ; and obtaining a 2-D contour plot therefor. Next, (i) repeating (a) through (h) until, by an examination of the 2-  
20 D contour plot of **DSCRN**, an approximation to a desired circular symmetry is achieved.